

WHAT IS CLAIMED IS:

1                   1.       A method of controlling data flow to reduce congestion in a server having  
2 a plurality of ports including a plurality of ingress ports and a plurality of egress ports,  
3 comprising the steps of:  
4                   detecting first congestion in a first data flow through a first component of said  
5 server, wherein said first component is coupled to one of said plurality of ports;  
6                   controlling said first data flow through said first component in response to said  
7 first congestion;  
8                   sending a first signal from said first component to a second component of said  
9 server in response to said first congestion; and  
10                  controlling a second data flow through said second component in response to said  
11 first signal.

1                   2.       The method of claim 1, further comprising:  
2                   detecting second congestion in said second data flow by said second component;  
3                   sending a second signal from said second component to a third component of said  
4 server in response to said second congestion;  
5                   controlling a third data flow through said third component in response to said  
6 second signal.

1                   3.       An apparatus including a server for reducing data flow congestion when  
2 processing data between a plurality of devices connected via a network, said server comprising:  
3                   a plurality of ports configured for ingress and egress of a plurality of data frames  
4 having a first format;  
5                   a plurality of port manager processors, coupled to said plurality of ingress ports  
6 and said plurality of egress ports, said plurality of port manager processors being configured to  
7 translate said plurality of data frames between said first format and a second format, said  
8 plurality of port manager processors being further configured to detect first congestion and to  
9 control a first data flow of said plurality of data frames when said first congestion is detected;  
10                  a plurality of traffic manager processors, coupled to said plurality of port manager  
11 processors, said plurality of traffic manager processors being configured to communicate said

12 plurality of data frames with associated ones of said plurality of port manager processors, said  
13 plurality of traffic manager processors being further configured to detect second congestion and  
14 to control a second data flow of said plurality of data frames when said second congestion is  
15 detected; and  
16 a plurality of storage processors coupled together and coupled to said plurality of  
17 traffic manager processors, said plurality of storage processors being configured to direct said  
18 plurality of data frames according to an associated ingress port and an associated egress port of  
19 said plurality of ports, said plurality of storage processors being further configured to detect third  
20 congestion and to control a third data flow of said plurality of data frames when said third  
21 congestion is detected.

1 4. The apparatus of claim 3, wherein said network comprises a Fibre Channel  
2 network.

1 5. The apparatus of claim 3, wherein said first format comprises a Fibre  
2 Channel format.

1 6. The apparatus of claim 3, wherein said plurality of ports comprises eight  
2 Fibre Channel ports, said plurality of port manager processors comprises four port manager  
3 processors, said plurality of traffic manager processors comprises two traffic manager  
4 processors, and said plurality of storage processors comprises two storage processors.

1 7. The apparatus of claim 3, wherein said second format comprises a Packet  
2 Over Synchronous Optical Network (SONET) (POS) format.

1 8. The apparatus of claim 3, wherein one of said plurality of data frames  
2 travels in an ingress direction via one of said plurality of ports, then via one of said plurality of  
3 port manager processors, then via one of said traffic manager processors, then via one of said  
4 plurality of storage processors.

1 9. The apparatus of claim 3, wherein one of said plurality of data frames  
2 travels in an egress direction via one of said plurality of storage processors, then via one of said  
3 traffic manager processors, then via one of said plurality of port manager processors, then via  
4 one of said plurality of ports.

1                   10.     The apparatus of claim 3, wherein said first congestion comprises ingress  
2 congestion, wherein one of said plurality of port manager processors detects said ingress  
3 congestion via a signal from an associated one of said plurality of traffic manager processors,  
4 and wherein said one of said plurality of port manager processors controls said first data flow by  
5 buffering packets of said plurality of data frames.

1                   11.     The apparatus of claim 3, wherein said first congestion comprises egress  
2 congestion, wherein one of said plurality of port manager processors sends a signal to an  
3 associated one of said plurality of traffic manager processors, and wherein said associated one of  
4 said plurality of traffic manager processors controls said second data flow in response to said  
5 signal.

1                   12.     The apparatus of claim 3, further comprising:  
2 a plurality of buffers, coupled to said plurality of traffic manager processors,  
3 configured to buffer one or more of said plurality of data frames when said second congestion is  
4 detected.

1                   13.     The apparatus of claim 3, wherein said second congestion comprises  
2 ingress congestion, wherein one of said plurality of traffic manager processors sends a signal to  
3 an associated one of said plurality of port manager processors, and wherein said associated one  
4 of said plurality of port manager processors controls said first data flow in response to said  
5 signal.

1                   14.     The apparatus of claim 3, wherein said second congestion comprises  
2 egress congestion, wherein one of said plurality of traffic manager processors sends a signal to  
3 an associated one of said plurality of storage processors, and wherein said associated one of said  
4 plurality of storage processors controls said third data flow in response to said signal.

1                   15.     The apparatus of claim 3, wherein one of said plurality of traffic manager  
2 processors sends a queue status message to an associated one of said plurality of storage  
3 processors, and said associated one of said plurality of storage processors controls said third data  
4 flow in response to said queue status message.

1                   16.     The apparatus of claim 3, wherein said third congestion comprises ingress  
2 congestion, wherein one of said plurality of storage processors sends a first signal to an  
3 associated one of said plurality of traffic manager processors, wherein said associated one of said  
4 plurality of traffic manager processors controls said second data flow in response to said first  
5 signal and sends a second signal to an associated one of said plurality of port manager  
6 processors, and wherein said associated one of said plurality of port manager processors controls  
7 said first data flow in response to said second signal.

1                   17.     The apparatus of claim 3, wherein said third congestion comprises egress  
2 congestion, wherein a first one of said plurality of storage processors sends a signal to a second  
3 one of said plurality of storage processors, and wherein said second one of said plurality of  
4 storage processors controls said third data flow in response to said signal.

1                   18.     The apparatus of claim 3, wherein one of said plurality of storage  
2 processors includes:  
3                   an egress buffer configured to buffer one or more of said plurality of data frames  
4 when said third congestion, corresponding to egress congestion, is detected.

1                   19.     The apparatus of claim 3, wherein one of said plurality of storage  
2 processors includes:  
3                   an ingress buffer configured to buffer one or more of said plurality of data frames  
4 when said third congestion, corresponding to ingress congestion, is detected.

1                   20.     The apparatus of claim 3, wherein one of said plurality of storage  
2 processors executes a computer program that controls said one of said plurality of storage  
3 processors to control said third data flow and to send congestion information to another of said  
4 plurality of storage processors.

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